84659

Growth of Metal Monocrystals Under High Hydrostatic Pressure

S/020/60/135/001/011/030
B006/B056

The crystal structure was subjected to X-ray examination; the results obtained by these examinations are intended to be published in a later paper. There are 2 figures and 20 references: 12 Soviet, 2 German, 4 US, and 2 British.

ASSOCIATION: Institut fiziki vysokikh davleniy Akademii nauk SSSR (Institute of Physics of High Pressures of the Academy of Sciences USSR)

X

SUBMITTED: July 7, 1960

Card 3/3

S/020/60/135/005/018/043
B019/B067

AUTHORS: Voronov, F. F., Vereshchagin, L. F., Corresponding Member of the AS USSR, and Goncharova, V. A.

TITLE: Effect of Hydrostatic Pressure on the Elastic Properties of Cerium

PERIODICAL: Doklady Akademii nauk SSSR, 1960, Vol. 135, No. 5, pp. 1104-1107

TEXT: In the introduction, the authors describe the cerium anomalies at high pressures and low temperatures which have been known for a considerable period of time. They mention A. I. Likhter, Yu. N. Ryabinin, L. F. Vereshchagin (Ref. 1), and Bridgman (Ref. 2). The authors studied the elastic properties at high pressure, and their changes on a polymorphous transition of the structure by means of ultrasonic methods. The propagation of ultrasonic waves with a frequency of 3.5 - 5.5 megacycles was measured by means of a pulse device shown in Fig. 1. Specimens contained 98.5% Ce, 1.5% of rare earths, 0.002% Fe, and 0.005% Pb, Bi, Sn, and Sb, their diameter was 20 mm, their lengths differed. With increasing

Card 1/2

Effect of Hydrostatic Pressure on the Elastic Properties of Cerium

S/020/60/135/005/018/043
B019/B067

pressure, phase transition took place at 7650±50 kg/cm^2, with decreasing pressure, at 5950±50 kg/cm^2. Formulas are given for calculating the elasticity characteristics from the results of sound velocity measurements. Figs. 2 and 3 graphically show the dependence of the propagation velocity v_l of longitudinal waves, of the propagation velocity v_t of transverse waves, and the Debye temperature on hydrostatic pressure, as well as the dependence of elastic properties on hydrostatic pressure. There are 3 figures and 15 references: 7 Soviet, 1 German, and 6 US.

ASSOCIATION: Institut fiziki vysokikh davleniy Akademii nauk SSSR (Institute of the Physics of High Pressures of the Academy of Sciences USSR)

SUBMITTED: August 22, 1960

Legend to Fig. 1: 1) trigger block, 2) pulse generator, 3) amplifier, 4) oscilloscope, 5) obtuator, 6) screwed nut, 7) high-pressure container, 8) electric supply lines, 9) piezoelement, 10) cerium specimens, 11) piezoreceiver.

Card 2/4

S/120/61/000/003/025/041
E194/E155

AUTHORS: Bilevich, A.V., Vereshchagin, L.F., and Kalashnikov, Ya.A.

TITLE: A piezometer for determining the density of gases at high pressures and temperatures

PERIODICAL: Pribory i tekhnika eksperimenta, 1961, No.3, pp.146-150

TEXT: This article describes equipment which can be used to measure the compressibility of gases at pressures up to 3500 kg/cm^2 at temperatures up to 400 °C with a total error not exceeding 0.1%. The novel features of the equipment are the high-pressure piezometer and miniature needle valve. A piezometer described by M. Benedict (Ref.1: J. Amer. Chem. Soc., 1937, Vol.59, 2224) suffers from a number of practical disadvantages from which the present equipment is free. The main parts of the present author's piezometer are a thick-walled bulb 90 mm long, 8 mm internal diameter and 16 mm external diameter. It screws on to a head which carries a capillary tube with a high-pressure needle valve. The needle valve, illustrated in Fig.2, has a steel needle 1, a sealing nut 2 and a gland consisting of

Card 1/4

A piezometer for determining the ...

three metal rings, one of copper 3, and two of steel 4. The steel needle is ground to fit the inner diameter of the gland. The shank at the head of the needle is threaded to fit the threaded internal diameter of the sealing nut. The outer surfaces of the gland rings are a ground fit in the casing. Tests made with nitrogen at a pressure of 4.2 tons/cm^2 and at room temperature, and at 3.5 tons/cm^2 and temperature of 400 °C, gave satisfactory results. Still higher values could no doubt be obtained if other grades of heat-resisting steel were used in the construction. The volume of the piezometer is about 5 mℓ; it was carefully calibrated with carbon tetrachloride. In carrying out tests the piezometer is contained in a hollow copper block which is within a 300 W heating furnace. For purposes of weighing, the piezometer is suspended by a wire from the arm of an analytical balance which is on a bench above the furnace. The piezometer can thus be weighed without withdrawing it from the furnace. The arrangements that are made to fill the piezometer with clean gas and to measure the pressure on a standard manometer call for no comment. The following formula is used to calculate the change in volume

Card 2/5

of the piezometer due to thermal expansion:

$$v_t = v_o(1 + 3.25 \times 10^{5}t + 2.85 \times 10^{-8}t^2 - 1.65 \times 10^{-11}t^3)$$

An expression is also given for the change in volume due to pressure but when this was checked experimentally by a procedure which is described it was found to be in error. This can be seen from the curve of Fig.5, where the volume change as a function of pressure at temperatures of 21, 90 and 147 °C is plotted in tons/cm^2 as curve a. Curve b corresponds to the formula used, which is evidently inaccurate. The test procedure is as follows. The piezometer is heated to the test temperature, then filled with compressed gas and allowed to stand connected to the gas supply with the valve open for 20-30 minutes to equalise the pressure and temperature. The piezometer is then disconnected from the high-pressure gas supply with the needle valve closed and is weighed. The gas is then released and it is weighed again. The volume and weight of gas being accurately known under the given conditions of temperature and pressure, the density and other characteristics can be calculated.

Card 3/5

A piezometer for determining the S/120/61/000/003/025/041
E194/E155

B.K. Muratovskiy is thanked for his assistance. There are 5 figures and 7 references: 3 Soviet and the following 4 English Language references:

Ref.1: as in text above.
Ref.4: A.E.H. Love, Math. Theory of Elas., 1927, London.
Ref.5: P.W. Bridgman, J. Amer. Chem. Soc., 1937, Vol.59, 2233.
Ref.6: P.W. Bridgman, Proc. Amer. Acad. Arts and Sci., 1935, Vol.70, 1.

ASSOCIATION: Institut fiziki vysokikh davleniy, AN SSSR
(Institute of High-Pressure Physics, AS USSR)

SUBMITTED: July 12, 1960

Card 4/5

S/120/61/000/002/041/042
E113/E135

AUTHORS: Stepanov, V.A., and Vereshchagin, L.F.

TITLE: High temperature resistance heater with graphite spiral heating element for high pressure vessels

PERIODICAL: Pribory i tekhnika eksperimenta, 1961, No.2, pp.194-195

TEXT: The design of the heater for heating the inside of vessels containing high pressure gas is shown in Fig.1. The heating element is a spiral (3), turned from a graphite rod together with robust end pieces. To increase the electrical contact area threads are cut in the end pieces on which the stainless steel contacts 1 and 10 are screwed. The heating element is surrounded by graphite tube (4) which is electrically insulated from the spiral by a pyrophyllite bush (6), put on the cylindrical neck of the intruding end piece. On each end the bush is fixed to the heating element by three porcelain pins (7), so that there is no relative movement between the spiral and the end pieces. The pins are in the relatively large uncut parts of the end pieces. The end pieces have small ohmic resistance and are placed sufficiently far away from the spiral so that the pins cannot

Card 1/ #3

overheat. Around the graphite tube (4), five coiled molybdenum sheet shields, each 0.2 mm thick, are fitted concentrically. The shields are spaced with gaps of 0.1 mm between them, which are maintained by means of two rows of pointed projections along the edges of the shields. The shields are held together by toothed rings; these create a gap of 2 mm between the inner wall of cover and the outer shield allowing only point contact at the teeth for heat conduction. Into this gap fireproof material in powder form is poured for additional heat insulation (for instance MgO). This gap and the annuli between the shields are closed with pyrophyllite washers (2) and (9). The length of the assembled heater is 120 mm, diameter 30 mm, corresponding to the diameter of the operating pipe of the high pressure vessel. The heater can be easily withdrawn and placed into the high pressure vessel by means of a rod screwed on the threaded part of contact (1)(Fig.1). Contact (10) sits on the "finger" of the lead which is placed in the middle of the cover closing the high pressure vessel. The other end of the spiral is connected to the wall of the pipe by means of contact (1) and in this way the electrical circuit is closed through the body of the vessel. The maximum working

temperature of the heater depends on the material used. Graphite has been chosen as it has the best properties for this application. A heater of given dimensions gave a temperature rise up to 2200 °C at 15 katm. pressure, with a power consumption of 2.8 kW to 3 kW. The effectiveness of the present method of heat insulation has been tested experimentally (in Ar, N_2 and CO_2 atmospheres), and it was found that at 2200 °C inside the heater and at 15 katm. after one hour of continuous operation, at a point in the wall of the high pressure vessel 15 mm from its inner wall, the temperature was 170 °C. The heater withstood satisfactorily several cycles of applying and relieving the pressure. Acknowledgements are expressed to I.Ye. Surkov and V.A. Frolov who assisted in the construction of the heater. (This is an abridged translation). There are 2 figures and 4 references: 3 Soviet and 1 English.

ASSOCIATION: Institut fiziki bysokikh davleniy AN SSSR
(Institute of High Pressure Physics, AS USSR)

SUBMITTED: January 29, 1960

18 9200
24 2130

S/126/61/011/002/005/025
E021/E435

AUTHORS: Panova, G.Kh., Sekoyan, S.S. and Vereshchagin, L.F.

TITLE: Phase Diagram of Bismuth at Pressures and Temperatures up to 100000 kg/cm^2 and 500°C

PERIODICAL: Fizika metallov i metallovedeniye, 1961, Vol.11, No.2, pp.215-219

TEXT: The p-T phase diagram for bismuth had been investigated up to 100000 kg/cm^2 and 500°C in order to compare the results with other authors. The pressure equipment will be described in a later paper. A bismuth wire, 0.5 mm diameter, was placed in a container. The medium for transmitting the pressure was silver chloride which gives a quasi-hydrostatic pressure up to high pressures. The sample was heated by an electric current. The pressure in the container was determined from the force developed by the press. The apparatus was calibrated from the known polymorphic transformations of bismuth (24800 and 27000 kg/cm^2) thallium (43400 kg/cm^2) and barium (77400 kg/cm^2). The temperature was determined by the integral electrical power received by the wire after establishing that, with constant geometry of the sample

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S/126/61/011/002/005/025
E021/E435

Phase Diagram of ...

and constant thermal conductivity of the surrounding medium, the temperature of the middle of the sample was linearly proportional to the power and practically did not change with change in specific heat conductivity of the investigated sample or with pressure. This was done using different metals at various pressures. This method gave a temperature measurement with an accuracy of $\pm$ 5 - 10°C and eliminated the disadvantage of using electrical leads required for other methods of measurement. In the investigations of the phase diagrams of bismuth, polymorphic transformations were detected by means of the rapid changes in the electrical resistance of the sample. The relation between the resistance R (ohms) and the power W (watts) received by the sample was established and Fig.4 shows some of the results (жидкость - liquid; curves 1 to 12 relate to pressures of 28000 to 100400 kg/cm^2). From the results a phase diagram was constructed and is given in Fig.5 (dotted line - data of Bundy; top left of diagram - "liquid"). The average accuracy of the results was estimated as 2% for both temperature and pressure. The results are in good agreement with those of F.P.Bundy (Ref.6).

Card 2/5

S/126/61/011/002/005/025
E021/E435

Phase Diagram of ...

There are 5 figures, 1 table and 9 references: 4 Soviet and 5 non-Soviet.

ASSOCIATION: Institut fiziki vysokikh davleniy
(Institute of Physics of High Pressures)

SUBMITTED: May 20, 1960

Card 3/5

18.8200 1418,1138

S/126/61/011/003/010/017
E032/E514

AUTHORS: Voronov, F.F. and Vereshchagin, L.F.

TITLE: Effect of Hydrostatic Pressure on the Elastic Properties of Metals. 1. Experimental Data

PERIODICAL: Fizika metallov i metallovedeniye, 1961, Vol.11, No.3, pp. 443-450

TEXT: The effect of hydrostatic pressure on the elastic properties of polycrystalline specimens of pure metals has been investigated. The mechanical properties were investigated using a pulse ultrasonic method (10 Mc/s). The ultrasonic apparatus employed was described earlier by the authors and V. I. Murav'yev (Ref.6). The following materials were investigated: Al, 99.996% pure (Fe 0.0015%, Si 0.0015%, Cu 0.001%); Mg, 99.92% pure (Fe 0.04%, Si 0.01%, Cu 0.01%, Al 0.02%); armco-iron (Fe 99.8%, C 0.012%, Si 0.02%, Mn 0.02%, P.0.03%, S 0.03%); Be, 99.2% pure (Fe 0.36%, Mg 0.2%, Al 0.05%, Si 0.05%, Mn 0.02% Ni 0.015%; molybdenum, 99.88% pure (W 0.1%, Fe 0.005%, Al 0.002%, Cu, Zn, P, S, Mn, As 0.001%). The densities of these materials were found to be: Al - 2.695, magnesium - 1.731, armco-iron - 7.836, beryllium-1.843, molybdenum - 9.838 g/cm^3. Quartz plates were

Card 1/[illegible]5

attached to the ends of the specimens and their working frequency was 10 Mc/s. The elastic moduli were computed from the following data: length of specimen under pressure (ℓ), density (ρ_0), time of transit of longitudinal and transverse ultrasonic waves at atmospheric pressure and the change in these times on application of pressure, Δt_ℓ and Δt_t. Changes in length and density on application of pressure were corrected for using the results of Bridgman and others. The adiabatic bulk modulus was calculated from the formula

$$K_{s,0} = 4l_0^2 \rho_0 \left(t_{l,0}^{-2} - \frac{4}{3} t_{t,0}^{-2} \right) \qquad (1)$$

and the corresponding isothermal bulk modulus from

$$K_{T,0} = \frac{K_{s,0}}{1 + \frac{\alpha^2 T K_{s,0}}{l \cdot C_p}}, \qquad (2)$$

where α is the volume expansion coefficient, assumed to have the

following values for Al, Mg, Fe, Be and Mo, respectively: 7.09×10^{-5}, 7.66×10^{-5}, 3.52×10^{-5}, 3.65×10^{-5}, 1.54×10^{-5} deg^{-1}. The specific heat C_p at constant pressure for these materials was assumed to be 0.214, 0.235, 0.180, 0.475, 0.060 cal/g·deg, respectively. The temperature was T = 303°K, the mechanical equivalent of heat was assumed to be 4.182×10^7 erg/cal and at 2000 kg/cm^2 the adiabatic bulk modulus was calculated (on the first approximation) from the formula

$$K'_{s,2}=4l_0^2\rho_0\left(1+\frac{1}{3}\frac{\Delta P}{K_{T,0}}\right)\left[(l_{i,0}+\Delta l_i)^{-2}-\frac{4}{3}(l_{i,0}+\Delta l_i)^{-2}\right]. \quad (3)$$

The adiabatic bulk modulus $K'_{s,2}$ was then converted to the isothermal bulk modulus $K'_{T,2}$ in accordance with Eq.(2). Changes in C_p and α were neglected. Next, in order to introduce the correction, the average value of the bulk modulus in the range 0 to 2000 kg/cm^2 was used and the second approximation $K''_{s,2}$ was computed. The new average value of the isothermal modulus was

Card 3/10

then used in the correction term for the next approximation. This procedure can be continued indefinitely to obtain the values of $K_{s,i}$. Young's modulus, the shear modulus and the velocity of propagation of ultrasonic waves were computed from the formulae

$$E = \frac{3K_s}{A-1}, \text{ where } A = \frac{v_l^2}{v_t^2} = \frac{(l_{t,0} + \Delta l_t)^2}{(l_{t,0} + \Delta l_t^{\,0})}; \quad (5)$$

$$G = 4l_0^2\rho_0\left(1 + \frac{1}{3}\frac{\Delta P}{K_{T,2}}\right)\left(1 + \frac{1}{3}\frac{\Delta P}{K_{T,4}}\right)\ldots(l_{t,0} + \Delta l_t)^{-2}; \quad (6)$$

$$v = 2l_0\left(1 - \frac{1}{3}\frac{\Delta P}{K_{T,2}}\right)\left(1 - \frac{1}{3}\frac{\Delta P}{K_{T,4}}\right)\ldots(l_0 + \Delta l)^{-1}. \quad (7)$$

$$\sigma = \frac{1}{2}\frac{A-2}{A-1}. \quad (8)$$

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The Debye temperature was calculated from

$$\theta_D = \frac{h}{k}\left(\frac{9N_A}{4\pi}\right)^{\frac{1}{3}} l_0 \left(\frac{\rho_0}{M}\right)^{\frac{1}{3}} \left[(l_{l.0} + \Delta l_l)^3 + 2(l_{t.0} + \Delta l_t)^3\right]^{-\frac{1}{3}}, \quad (11)$$

and the average velocity of sound from

$$\bar{v} = \left(\frac{1}{v_l^3} + \frac{2}{v_t^3}\right)^{-\frac{1}{3}}. \quad (10)$$

In the above expressions N_a is the Avogadro number. All the results were obtained at 30°C. The numerical data are summarized in Figs. 1-5, in which the pressure is plotted along the horizonal axes in kg/cm^2. There are 5 figures, 2 tables and 16 references: 3 Soviet and 13 non-Soviet.

ASSOCIATION: Institut fiziki vysokikh davleniy AN SSSR (Institute of Physics of High Pressures AS USSR)

SUBMITTED: July 22, 1960

Card 5/10

89609

S/020/61/136/002/012/034
B019/B056

1.1210

AUTHORS: Vereshchagin, L. F., Corresponding Member of the AS USSR, Semerchan, A. A., Kuzin, N. N., and Popova, S. V.

TITLE: Changes in Resistivity of Some Metals at Pressures of up to 200 000 kg/cm^2

PERIODICAL: Doklady Akademii nauk SSSR, 1961, Vol. 136, No. 2, pp. 320-321

TEXT: The authors studied the resistivity of antimony, arsenic, and calcium at pressures of up to 200 000 kg/cm^2. Likewise, bismuth, whose resistivity has hitherto been known up to 140 000 kg/cm^2, was investigated. The bismuth and calcium specimens were made from wire, the antimony and arsenic specimens were thin single crystals. All specimens were chemically pure. As may be seen from changes in resistivity of the specimens graphically represented in Figs. 1, 2, and 3, arsenic and calcium have a monotonic change of resistivity with rising pressure, bismuth and antimony, however, have not. At 130 000 kg/cm^2, antimony shows a jump-like change

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89609

Changes in Resistivity of Some Metals at Pressures of up to 200 000 kg/cm^2

S/020/61/136/002/012/034
B019/B056

in resistivity, bismuth at 125 000 kg/cm^2. The authors point out the possible use of the jump-like change in resistivity of antimony at 130 000 kg/cm^2 for the calibration of high-pressure devices. A parallel connection of antimony and bismuth (Fig. 1 б) would be particularly suited. There are 4 figures and 2 references: 2 US.

ASSOCIATION: Institut fiziki vysokykh davleniy Akademii nauk SSSR (Institute of the Physics of High Pressures of the Academy of Sciences USSR)

SUBMITTED: October 10, 1960

Card 2/6

Vereshchagin

23807

S/020/61/138/001/011/023
B104/B201

9.4310 (1140, 1143, 1136) also 2108

AUTHORS: [illegible]akin, L. F., Corresponding Member of the AS USSR, Somercnan, A. A., Kuzin, N. N., and Popova, S. V.

TITLE: Change of resistivity of some metals at pressures up to 250,000 kg/cm^2

PERIODICAL: Doklady Akademii nauk SSSR, v. 138, no. 1, 1961, 84-85

TEXT: This is in continuation of an earlier paper by Vereshchagin et al. (DAN, 136, no. 2, (1961)). The authors wanted to find new polymorphous transformations at high pressures in metals being accompanied by an abrupt change of resistivity. Bridgman (Proc. Am. Acad. Arts and Sci., 81, 165 (1952)) and Bundy (Phys. Rev., 110, no. 2, (1958)) have been able to identify a considerable number of polymorphous transformations of various metals and alloys at high pressures. The possibility is pointed out of calibrating high-pressure apparatus with the aid of an abrupt change of the resistivity of different alloys at given pressures. The authors used a high-pressure chamber calibrated with the aid of the known resistivity

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Change of resistivity of some metals...

jumps to determine the resistivity of the following metals: Bi I - II (25,600 kg/cm^2); Bi II - III (27,000 kg/cm^2); Tl (45,000 kg/cm^2); Ba (80,000 kg/cm^2); Bi VI - VII (125,000 kg/cm^2). Pressure above 125,000 kg/cm^2 was determined by extrapolation (Fig. 1). The specimens were wires 0.6 - 0.8 mm in diameter, the medium transmitting the pressure was silver chloride. Measurements were conducted at room temperature. Measurement results are graphically presented in Fig. 2. R_{30} is the resistivity of the metal concerned at a pressure of 30,000 kg/cm^2.

Bridgman discovered on zirconium at a pressure above 80,000 kg/cm^2 a sharp drop of the resistivity. The authors have not been able to ascertain this drop up to 250,000 kg/cm^2. The difference in results is explained by a possible difference in the purity degree of the metals. The authors used zirconium iodide with 99.7 % purity. The following comparative data are offered: Bridgman obtained for Pb: $R_{100}/R_{30} = 0.694$, for Sn: $R_{100}/R_{30} = 0.707$, for Cd: $R_{100}/R_{30} = 0.795$. Under the same conditions

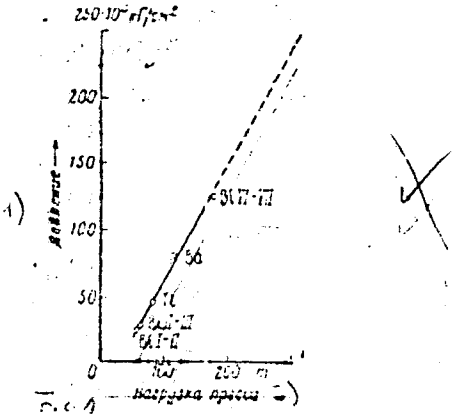
Change of resistivity of some metals...

and in the same succession the authors obtained: 0.683, 0.715, and 0.808. The difference is not in excess of 2 %. There are 2 figures and 3 references: 1 Soviet-bloc and 2 non-Soviet-bloc.

ASSOCIATION: Institut fiziki vysokikh davleniy Akademii nauk SSSR (Institute of Physics of High Pressures, Academy of Sciences USSR)

SUBMITTED: January [illegible], 1961

Legend to Fig. 1: 1. pressure in units of 10^3 kg/cm^2; 2, loading of press in tons.



Card 3/4

S/020/61/138/005/009/025
B104/B205

25309

24.7700 also 2108

AUTHORS: Vereshchagin, L. F., Corresponding Member AS USSR, Semerchan, A. A., and Popova, S. V.

TITLE: Study of the electrical resistance of cerium, lanthanum, and neodymium at pressures of up to 250,000 kg/cm^2

PERIODICAL: Akademiya nauk SSSR. Doklady, v. 138, no. 5. 1961. 1059-1061

TEXT: This is the continuation of previous papers by the authors (DAN, 136, no. 2, (1961); DAN, 138, no. 1 (1961)), in which the electrical resistance of metals at high pressures (up to 250,000 kg/cm^2) has been studied systematically. P. W. Bridgman (Proc. Am. Acad. Arts and Sci., 81, 165 (1952)) proved that cerium, lanthanum, and neodymium have a minimum at pressures ranging from 50,000 to 100,000 kg/cm^2. Cerium shows a minimum at 70,000 kg/cm^2 and a maximum at 90,000 kg/cm^2. Similar results were obtained by Bridgman for the other two metals. The investigations described here were conducted with a high-pressure chamber which had been calibrated with the help of known sudden changes of the electrical resistance of cer-

Card 1/3

tain pressures. The results are graphically represented in Figs. 2-4 The change of the electrical resistance R/R_{30} (R_{30} is the electrical resistance at a pressure of 30.000 kg/cm^2) shown in Fig. 2 indicates that cerium has a minimum at 55,000 kg/cm^2 and a maximum at 80,000 kg/cm^2. The maximum of the electrical resistance is taken as an indication of a polymorphous conversion occurring at this pressure. Fig. 3 shows analogous curves obtained for two specimens of lanthanum of varying purity: La-I (0.75% Nd, 0.70% Pr, 0.04% Fe) and La [illegible] (0.3% Nd, 0.2% Pr, 0.02% Fe). It may be seen that only the last-mentioned type of (chemically pure) lanthanum has a weakly marked minimum at a pressure of approximately 95,000 kg/cm^2 and weakly marked maxima at 110,000 and 140,000 kg/cm^2. It is assumed that a polymorphous conversion takes place also here at 110,000 kg/cm^2. Fig. 4 indicates that neodymium has indistinct minima and maxima at 80,000 and 90,000 kg/cm^2, respectively. This maximum is likewise ascribed to a polymorphous conversion. The different values of maxima and minima on the resistance curves are explained as being due to a great calibration error. All measurements were made with specimens in wire form

(1-1.5 mm diameter) at room temperature. Cerium impurities: less than 0.75% Nd, less than 0.75% Pr, $2 \cdot 10^{-2}$% Fe, $1 \cdot 10^{-3}$% Cd, $1 \cdot 10^{-3}$% Pb, $1 \cdot 10^{-3}$% Bi, and $1 \cdot 10^{-3}$% Sn; neodymium impurities: less than 0.36% Pr and La, and $2 \cdot 10^{-2}$% Ca. Following this series of articles, the authors will present a theoretical discussion of their results. There are 4 figures and 3 references: 2 Soviet-bloc and 1 non-Soviet bloc.

ASSOCIATION: Institut fiziki vysokykh davleniy Akademii nauk SSSR (Institute of Physics of High Pressures of the Academy of Sciences USSR)

SUBMITTED: March 4, 1961

Card 3/6

25713
S/020/61/139/003/012/025
B104/B201

24,9130

AUTHORS: Vereshchagin, L. F., Corresponding Member of the AS USSR, Semerchan, A. A., and Popova, S. V.

TITLE: Change of electric resistance of praseodymium, dysprosium, erbium, and ytterbium at pressures of up to 250,000 kg/cm^2

PERIODICAL: Akademiya nauk SSSR. Doklady, v. 139, no. 3, 1961, 585 - 586

TEXT: This is the fourth report on studies conducted on changes of electric resistance of metals at high pressures (Vereshchagin et al., DAN, 136, no.2, (1961); DAN, 138, no. 1, (1961); DAN, 135, no. 5, (1961). The change of relative resistance R/R_{25} (R_{25} being resistance at a pressure of 25,000 kg/cm^2) of praseodymium is graphically shown in Fig. 1. Reference is made to the minimum appearing at about 110,000 kg/cm^2, and it is stated that this pressure dependence of resistance is the same as the one in lanthanum; praseodymium and lanthanum exhibit the same crystal structure. In both of them, a polymorphous transformation of the crystal structure is believed to take place at this pressure. According to measurements by

Card 1/2

25713
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Change of electric resistance of .

P. W. Bridgman (Proc Am. Acad Arts and Sci., 1952, 81, 165 (1952)) the minimum for praseodymium is at 80,000 kg/cm^2. This difference is explained by a different degree of purity of the material. The relative resistance of dysprosium as a function of pressure is shown in Fig. 2. There is a minimum at 75,000 kg/cm^2; this dependence equals that of neodymium. Data for erbium are graphically presented in Fig. 3; for ytterbium, they are given in Fig. 4. The strongly pronounced maximum at 50,000 kg/cm^2 is explained by a polymorphous transformation or by an electron transition. Cerium exhibits the same dependence between relative resistance and pressure; both metals have a cubically face-centered lattice. In the following papers, the authors will examine the resistance of lanthanides as a function of pressure. There are 4 figures, 1 table, and 4 references: 3 Soviet-bloc and 1 non-Soviet-bloc.

ASSOCIATION: Institut fiziki vysokikh davleniy Akademii nauk SSSR (Institute of High-pressure Physics, Academy of Sciences USSR)

Card 2/4

S/181/62/004/006/035/051
B108/B138

AUTHORS: Frolov, A. P., Vereshchagin, L. F., and Rodionov, K. P.

TITLE: Changes in the lattice parameters of pentaerythrite under pressures of up to 10,000 kg/cm^2

PERIODICAL: Fizika tverdogo tela, v. 4, no. 6, 1962, 1608-1612

TEXT: A radiographic investigation of the lattice parameters a and c of pentaerythrite, $C(CH_2OH)_4$ was made in a beryllium high-pressure chamber. At room temperature with pressures up to 10,000 kg/cm^2, pentaerythrite has a tetragonal crystal lattice with the parameters a = 6.10 Å and c = 8.73 Å. At a pressure of 9,000 kg/cm^2, a = 5.99 Å and c = 8.46 Å. A discontinuity of a and c was observed between 4200 and 5600 kg/cm^2. The volume also changed suddenly by some 2.6%. These data are evidence of a phase transition in which, however, the crystal structure below and above the transition pressure remained the same. The behavior of pentaerythrite under pressure can be described by two empirical third-order equations of state:

Card 1/2

S/181/62/004/006/035/051
B108/B138

Changes in the lattice ...

Before transition: $-\frac{\Delta V}{V_0} = 1.584 \cdot 10^{-5} P - 2.380 \cdot 10^{-9} P^2 + 0.330 \cdot 10^{-13} P^3$;

after transition: $-\frac{\Delta V}{V_0} = 2.404 \cdot 10^{-5} P - 3.848 \cdot 10^{-9} P^2 + 2.202 \cdot 10^{-13} P^3$.

Above the pressure of transition, compressibility increases with increasing pressure. There are 5 figures and 1 table.

ASSOCIATION: Institut fiziki metallov AN SSSR, Sverdlovsk (Institute of Physics of Metals AS USSR, Sverdlovsk). Institut fiziki vysokikh davleniy AN SSSR, Moskva (Institute of High-pressure Physics AS USSR, Moscow)

SUBMITTED: February 15, 1962

Card 2/2

S/181/62/004/007/030/037
B178/B104

AUTHORS: Yevdokimova, V. V., and Vereshchagin, L. F.

TITLE: Polymorphous transition in NaCl

PERIODICAL: Fizika tverdogo tela, v. 4, no. 7, 1962, 1965-1966

TEXT: At pressures close to $1.8 \cdot 10^4$ kg/cm^2, NaCl acquires a structure of the CsCl type. Its original lattice is stable, the constant equals 3.39-0.06 Å at atmospheric pressure. The density of the new phase is 2.535 g/cm^3, and the discontinuity in the specific volume during the transformation is 14.2%. Allowing for the fact that the distance between the oppositely charged ions increases by 3% the lattice constant of the new phase is found to be 3.35 Å. When the pressure is released, the new phase is usually maintained. Shear deformation might play a significant role in the phase transition. There are 1 figure and 1 table.

ASSOCIATION: Institut fiziki vysokikh davleniy AN SSSR Moskva
(Institute of the Physics of Pressures AS USSR, Moscow)

SUBMITTED: March 19, 1962

Card 1/1

FROLOV, A.P.; VERESHCHAGIN, L.F.; RODIONOV, K.P.; OLEYNIK, M.I.

Methods of X-ray investigation of materials under high pressures. Part 2: Equipment for the preparation of X-ray pictures of powders under pressure of up to 18,000 kg/cm^2. Fiz. met. i metalloved. 14 no.1:80-84 Jl '62. (MIRA 15:7)

1. Institut fiziki metallov AN SSSR i Institut fiziki vysokikh davleniy AN SSSR.
(Metal powders) (X rays—Diffraction)

S/057/62/032/002/016/022
B124/B102

AUTHORS: Vereshchagin, L. F., Zubova, Ye. V., and Shapochkin, V. A

TITLE: Electric contact resistance at high normal pressures

PERIODICAL: Zhurnal tekhnicheskoy fiziki, v. 32, no. 2, 1962, 230 - 232

TEXT: The pressure dependence of the electric contact resistance of pistons made of ШХ15 (ShKh15) steel and of a powder-metallurgical hard alloy of the type ВК6 (VK6) was examined at pressures of up to 100,000 kg/cm^2, using the high-contact-pressure method developed at the authors' institute. The purity and the quality of the contact surfaces were kept constant in all experiments. The diameter of the rated contact area of the pistons was also constant and equal to 3 or 6 mm. The electric contact was calculated from the change in contact resistance measured with a potentiometer of type ППТН-1 (PPTN-1) and a high-sensitivity galvanometer of type М21/4 (M21/4) with low internal resistance. Heating of the contact and the relevant change in resistance were excluded by using 1- to 2-ma currents. The voltage drop was measured for two current directions, and the average value was determined. The contact resistance was calculated from

Card 1/

Electric contact resistance ...

$R_x = \frac{R_n U_x}{U_n}$, where R_n is the standard resistance, U_n is the voltage drop on the standard sample, and U_x is the voltage drop on the sample examined. Pressure was gradually raised by 1,000 to 10,000 kg/cm^2 up to 100,000 kg/cm^2. Voltage drop measurements were repeated 15 to 20 times, and each test 3 to 4 times, with the first test results being neglected, as a rule. The results shown in Fig. 2 are in good agreement with those of other authors. There are 2 figures and 4 Soviet references.

ASSOCIATION: Institut fiziki vysokikh davleniy AN SSSR, Moskva (Institute of High-Pressure Physics, AS USSR, Moscow)

SUBMITTED: February 6, 1961

34215
S/057/62/032/002/017/022
B124/B102

15.2240

AUTHORS: Vereshchagin, L. F., Shapochkin, V. A., and Pirogova, L. B.

TITLE: Contact compressive strength of hard alloys of type ВК(VK)

PERIODICAL: Zhurnal tekhnicheskoy fiziki, v. 32, no. 2, 1962, 235 - 237

TEXT: The compressive strength and residual properties (strength and plasticity) of pistons made of the sintered carbides ВК8В(VK8V), ВК6В(VK6V) ВК6(VK6), and ВК4В(VK4V) were tested using special device. The diameter of the contact surface was 3-3.5 mm. Pistons were tested by applying only perpendicular pressure or perpendicular pressure and torque simultaneously. In the former case, the load was raised first to 100,000 kg/cm^2, then the sample was unloaded and examined for cracks, and loaded again at intervals of 100,000 kg/cm^2 until the first cracks appeared. In the latter case stepwise loading by 10,000-20,000 kg/cm^2 was used, and, at a certain perpendicular pressure, torque was applied until the first cracks appeared. The results indicate that the contact compressive strength of the alloys increases with decreasing cobalt content. The breaking load is lowered by 20% when

Card 1/3

Contact compressive strength ...

torque has been applied. The highest perpendicular load (350,000 kg/cm^2) could be applied to VK4V pistons, while VK84 pistons cracked under a pressure of 220,000 kg/cm^2. Application of torque to VK4V gave most pronounced effects; the breaking load of the ВК6ТаС(VK6TaS) alloy was about 300,000 kg/cm^2. It was found by microhardness tests with the device ПМТ-3 (PMT-3) that (1) microhardness increases equally both with perpendicular pressure and with pressure plus torque; (2) cold hardening of the contact surface is constant at all points of the surface except the border; (3) residual hardening reaches a maximum in VK4V (about 20%) and a minimum in VK8V (about 5%). Radial and annular cracks were formed in positions and distributions dependent on the kind of load. Tangential stresses as a function of perpendicular pressure were measured for VK8V, VK6V, and VK4V between 10,000 and 200,000 to 300,000 kg/cm^2. The friction coefficients of all alloys at pressures up to 250,000 - 300,000 kg/cm^2 were all about 0.185, with a 1.5- to 2-fold decrease with increasing pressure. Mechanic L. M. Voyeykov and laboratory assistant Z. A. Levchenko are thanked. There are 5 figures, 1 table, and 5 Soviet references.

Card 2/3

34215
S/057/62/0 32/002/017/022
B124/B102

Contact compressive strength ...

ASSOCIATION: Institut fiziki vysokikh davleniy AN SSSR, Moskva (Institute of High-pressure Physics, AS USSR, Moscow)

SUBMITTED: February 5, 1961

X

Card 3/3

VERESHCHAGIN, L.F.; YUZEFOVICH, N.A.

Effect of pressure on the state of isomeric molecules. Zhur.-fiz.khim. 36 no.5:969-972 My '62. (MIRA 15:8)

1. Institut fiziki vysokikh davleniy, AN SSSR.
(Alcohols) (Ultrasonic testing)

S/056/62/043/004/ 014/061
B102/B180

AUTHORS: Yevdokimova, V. V., Vereshchagin, L. F.

TITLE: Polymorphic transition in sodium chloride under pressure

PERIODICAL: Zhurnal eksperimental'noy i teoreticheskoy fiziki, v. 43, no. 4(10), 1962, 1208 - 1212

TEXT: Pressures of up to 18,000 kg/cm^2 were applied to powder samples of "extra" table salt and of NaCl single crystals and the pressure-induced changes in volume and structure were studied by X-ray analysis. A new phase appeared at 17,700 kg/cm^2, i. e. the cubic face-centered lattice of normal NaCl changes to a CsCl-type lattice with a mean lattice constant of 3.36±0.04 Å. The density of the new phase is ρ = 2.535 g/cm^3, that of the initial phase ρ_0 = 2.165 g/cm^3, so that the volume change ΔV = 14.2% per mole. If a denotes the lattice constant of the new and b that of the initial phase, 0.58b < a < 0.63 b. The pressure dependence of the change in volume can be described by $-\Delta V/V_0 = 14.30 \cdot 10^{-2} + 36.0 \cdot 10^{-7} p - 60.0 \cdot 10^{-12} p^2$,

Card 1/2

where V_o is the molecular volume of initial NaCl. After pressure relief about 2% of the new phase still remained. There are 2 figures and 3 tables.

ASSOCIATION: Institut fiziki vysokikh davleniy Akademii nauk SSSR (Institute of the Physics of High Pressures of the Academy of Sciences USSR)

SUBMITTED: May 15, 1962

S/020/62/143/004/010/027
B104/B102

AUTHORS: Kabalkina, S. S., and Vereshchagin, L. F., Corresponding Member AS USSR

TITLE: An X-ray diffraction study of the effects of hydrostatic pressure up to 18,000 kg/cm^2 on the structure of lead titanate

PERIODICAL: Akademiya nauk SSSR. Doklady, v. 143, no. 4, 1962, 818 - 821

TEXT: The investigation was carried out at room temperatures by means of a special high-pressure chamber (Fig. 2) with a fine-focus tube and copper anode. The ceramic samples were delivered by the Fiziko-khimicheskiy institut im. L. Ya. Karpova (Physicochemical Institute imeni L. Ya. Karpov) and had the following lattice parameters: a = 3.903 Å, c = 4.154 Å, c/a = 1.064. With increasing pressure a decrease of the cell tetragonality and a lowering of the Curie point are observed. At 18,000 kg/cm^2 c is considerably smaller ($\Delta c = -0.10$ Å) and a is slightly greater, (Δa = +0.01 Å). The relative change of c is a linear function of pressure p: $\Delta c/c = 14.3 \cdot 10^{-7} \cdot p$. The change of parameters with increasing pressure

Card 1/2

An X-ray diffraction ...

coincides qualitatively with their change as temperature functions. At 480°C $\Delta c = -0.129$ Å and $\Delta a = 0.048$ Å. High pressure and high temperature lower the polarization. The compressibility of the ferroelectric phase of $PbTiO_3$ is assumed to be a superposition of normal compression and deformation combined with a decrease of polarization under pressure. There are 4 figures and 1 table.

SUBMITTED: December 29, 1961

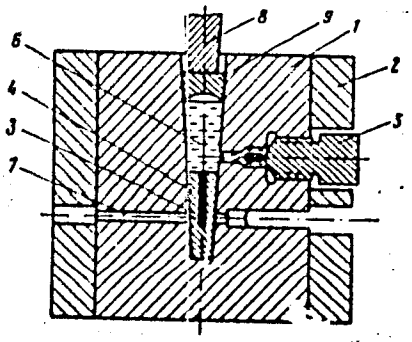


Fig. 2. High-pressure chamber.
Legend: (1) internal cylinder; (2) external cylinder; (3) sample; (4) beryllium cone; (5) lead-in, to which a manganin manometer is connected; (6) liquid; (7) diaphragm; (8) piston.

S/020/62/144/005/004/017
B125/B104

15 2520

AUTHORS: Kabalkina, S. S., Vereshchagin, L. F., Corresponding Member AS USSR, and Shulenin, B. M.

TITLE: X-ray study of the effect of hydrostatic pressure on the structure of barium titanate

PERIODICAL: Akademiya nauk SSSR. Doklady, v. 144, no. 5, 1962, 1019-1021

TEXT: The effect of hydrostatic pressure on the structure of barium titanate was studied at room temperature. X-ray pictures with reflection angles of 60-80° were recorded under pressures of 1-6000 kg/cm^2, using a KRQS (KROS) X-ray camera and an auxiliary high-pressure unit. The barium titanate specimens (lattice constants, a = 3.993 Å and c = 4.032 Å; Curie temperature T_{Cur} = 118°C) had been supplied by the Fiziko-khimicheskiy institut im. L. Ya. Karpova (Physicochemical Institute imeni L. Ya. Karpov). The values of a, c, and T_{Cur} at high pressures were determined using the line group with $h^2+k^2+l^2$ = 26 (θ = 77-80°).

Card 1/3

S/020/62/144/005/004/017
B125/B104

X-ray study of the effect of ...

The X-ray pattern of $BaTiO_3$ is shifted under high pressure but returns to its original position when the specimen is unloaded. $(1/p)\Delta V/V$ was found to be $15.2 \cdot 10^{7}$ cm^2/kg. As the pressure is increased from 1 to 6000 kg/cm^2, c decreases from 4.033 to 4.020 Å, a from 3.995 to 3.990 Å, and c/a from 1.010 to 1.0085, while $\Delta a/a$ increases from 0 to ~0.13%, and $\Delta c/c$ from 0 to 0.25%. Most of these changes are linear in first approximation. Decrease of the Curie temperature diminishes the "tetragonality" of the lattice. The pressure dependence of a, c, and c/a in $BaTiO_3$ is qualitatively in accordance with the dependence of the respective quantities of the solid solution $(Ba\text{-}Sr)TiO_3$ on its content of $SrTiO_3$. The compressibility $\Delta c/c$ of $PbTiO_3$ is almost four times that of $BaTiO_3$. The ferroelectric phase becomes compressible by the superposition of deformation and normal compression, attended by a decrease in polarization. The stretching of the $PbTiO_3$ lattice in the a-direction is of larger amount than the normal compression, and that of the $BaTiO_3$

Card 2/3

X-ray study of the effect of ...

lattice is smaller. The hydrostatic pressure affects the structure of lead titanate much more than that of barium titanate. There are 4 figures and 2 tables. The most important English-language reference is: J. Merz, Phys. Rev., 78, 52 (1950).

ASSOCIATION: Institut fiziki vysokikh davleniy Akademii nauk SSSR (Institute of the Physics of High Pressures of the Academy of Sciences USSR)

SUBMITTED: February 23, 1962

Card 3/3

VERESHCHAGIN, L.F.; YUZEFOVICH, N.A.; CHELOVSKIY, A.V.

Measurement of ultrasound velocities in some highly compressed gases. Dokl. AN SSSR. 144 no.6:1272-1274 Je '62. (MIRA 15:6)

1. Institut fiziki vysokikh davleniy Akademii nauk SSR.
2. Chlen-korrespondent Akademii nauk SSSR (for Vereshchagin).
(Ultrasonic waves--Speed) (Gases, Compressed)

3896 (1)
S/020/62/145/001/009/018
B104/B102

AUTHORS: Vereshchagin, L. F., Corresponding Member AS USSR, Semerchan, A. A., Zubkov, V. M., and Kuzin, N. N.

TITLE: High-pressure and high-temperature apparatus with several pairs of electric lead-in wires

PERIODICAL: Akademiya nauk SSSR. Doklady, v. 145, no. 1, 1962, 71-72

TEXT: Difficulties arising in the current feed to high-pressure apparatus were overcome by the device shown in Fig. 1. Specimen 4 is placed in a cylindrical container inside a high-pressure chamber 5. Two pistons 9 compress the specimen. During compression the pyrophillite seals 2 enter the gaps (~ 0.1 mm) between the four sectors of pistons 9. The current is fed through the piston to the cylindrical graphite or metal container which is used as a furnace. The apparatus was calibrated for pressures of up to 50,000 kg/cm^2 by making use of the jumps known to occur in the electric conductivity of Bi and Tl at certain temperatures. There are 3 figures.

Card 1/2

S/020/62/145/001/009/018
B104/B102

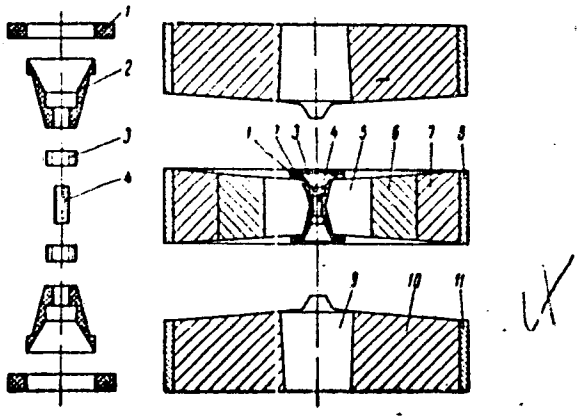
High-pressure and high-temperature...

ASSOCIATION: Institut fiziki vysokikh davleniy Akademii nauk SSSR (Institute of the Physics of High Pressures of the Academy of Sciences USSR)

SUBMITTED: March 20, 1962

Fig. 1. High-pressure apparatus.

Legend: (1) and (2) pyrophillite seals; (3) ring for pressure transmission; (4) specimen; (5) high-pressure chamber.



Card 2/2

VERESHCHAGIN, L.F.; SEMERCHAN, A.A.; POPOVA, S.V.; KUZIN, N.N.

Variations in the electric resistance of certain semiconductors at pressures up to 300,000 kg./cm.^{2}. Dokl.AN SSSR 145 no.4:757-760 Ag '62. (MIRA 15:7)

1. Institut fiziki vysokikh davleniy AN SSSR. 2. Chlen-korrespondent AN SSSR (for Vereshchagin).
(Semiconductors--Electric properties)

SEMERCHAN, A.A.; KUZIN, N.N.; VERESHCHAGIN, L.F.

Temperature dependence of the electric resistance of polycrystalline graphite at pressures up to 250,000 kg./cm^2. Dokl. AN SSSR 146 no.4:803-804 O '62. (MIRA 15:11)

1. Institut fiziki vysokikh davleniy AN SSSR. 2. Chlen-korrespondent AN SSSR (for Vereshchagin).
(Graphite crystals—Electric properties)
(High-pressure research)

KUZIN, N.N.; SEMERCHAN, A.A.; VERESHCHAGIN, L.F.; DROZDOVA, L.N.

Temperature dependence of the electroconductivity of iodine at pressures up to 200,000 Kg./cm^2. Dokl. AN SSSR 147 no.1:78-79 N '62. (MIRA 15:11)

1. Institut fiziki vysokikh davleniy AN SSSR. 2. Chlen-korrespondent AN SSSR (for Vereshchagin).
(Iodine—Electric properties)
(High-pressure research)

ACCESSION NR: AP4009138 S/0056/63/045/006/2073/2076

AUTHORS: Kabalkina, S. S.; Vereshchagin, L. F.; Shulenin, B. M.

TITLE: Phase transitions in tellurium at high pressures

SOURCE: Zhurnal eksper. i teoret. fiziki, v. 45, no. 6, 1963, 2073-2076

TOPIC TAGS: tellurium high pressure, phase transition, reversible phase transition, tellurium crystal structure, x ray diffraction pattern, x ray diffraction, Patterson Harker section, chain structure, laminar structure

ABSTRACT: An x-ray diffraction study of tellurium was carried out at pressures up to 100 kbar in order to find how the crystal structure of tellurium changes at high pressure. Two reversible phase transitions were observed, at 15--20 and 42--45 kbar. At 15 kbar tellurium is shown to undergo a transition from the chain structure

Card 1/2

ACCESSION NR: AP4009138

A8 to the laminar structure A7, and the reasons why this transition was not detected by Bridgman (Proc. Am. Acad. Arts Sci. v. 60, 366, 1925) are explained. The structure of the second phase transition at 42--45 kbar could not be ascertained, but the constancy of the x-ray diffraction patterns above 45 kbar seems to cast doubts on the 69 kbar phase transition detected by Bridgman (Proc. Am. Acad. Arts Sci. v. 74, 425, 1942). Orig. art. has 2 figures and 2 tables.

ASSOCIATION: Institut fiziki vysokikh davleniy Akademii nauk SSSR (High Pressure Physics Institute, Academy of Sciences SSSR)

SUBMITTED: 11Sep63 DATE ACQ: 02Feb64 ENCL: 00

SUB CODE: PH NO REF SOV: 002 OTHER: 005

Card 2/2

L 10096-63 EPF(c)/EWP(q)/BDS/EWT(m) AFFTC/ASD/

AUTHOR: Kuzin, N. N.

TITLE: Changes in the resistivity of PbTe, CdTe, and Bi sub 2 Te sub 3 at pressures of up to 200,000 kg/cm sup 2

SOURCE: AN SSSR. Doklady, v. 150, no. 5, 1963, 1026-1028

TOPIC TAGS: semiconductors, lead telluride, cadmium telluride, bismuth telluride,

ABSTRACT: An investigation has been made of the pressure dependence of resistivity

Card 1/2

ACCESSION NR: AP3002871

also noted by other observers (G. A. Samara, H. G. Drickamer, The Physics and Chemistry of Solids, [illegible] original, and differ by [illegible] ohm-cm. The [illegible]

[illegible] + figures and [illegible]

ASSOCIATION: Institut fiziki vy sokikh davleniy Akademii nauk SSSR (Institute of Physics of High Pressures, Academy of Sciences SSSR)

SUBMITTED: 11Mar63 [illegible]

SUB CODE: GC

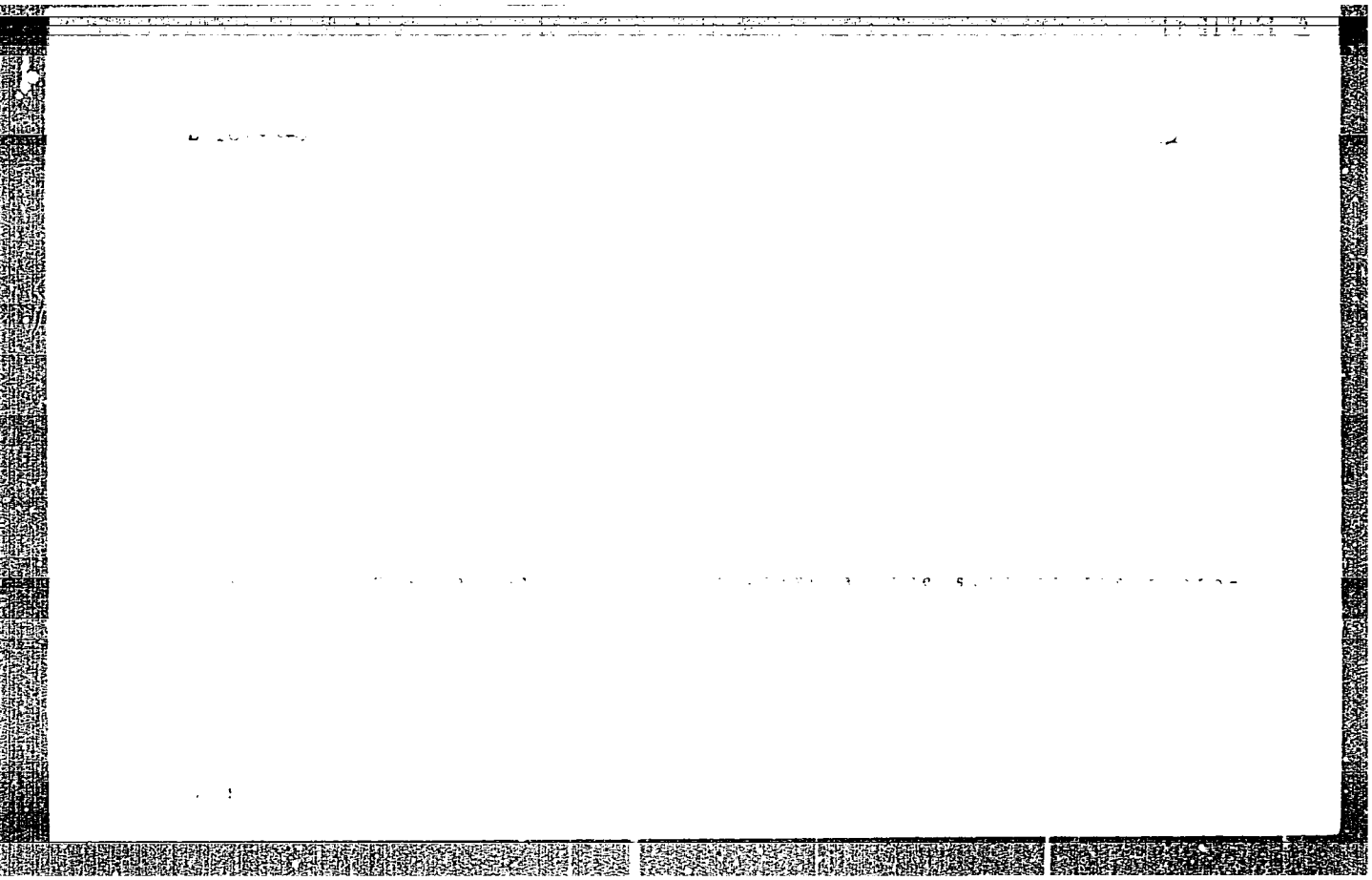
Card 2/2

TOPIC TAGS: graphite melting point, graphite melting pressure dependence, graphite melting pressure, graphite

ABSTRACT: Pressure dependence of the melting point of graphite

form of

Card 1/3



APPROVED FOR RELEASE: 09/01/2001 CIA-RDP86-00513R001859430003-8"

Sver for their valuable assistance in the i estigations. G. V. Shcheglakov took part in the work." Orig. art. has: 3 figures.

ASSOCIATION: Institut fiziki vysokikh davleniy, Akademii nauk

Card 1/1

FATEYEVA, N.S.; VERESHCHAGIN, L.F.; KOLOTYGIN, V.S.

Optical method for determining the melting point of graphite as dependent on pressure up to 40,000 atm. Dokl. AN SSSR 152 no.2:317-319 S '63. (MIRA 16:11)

1. Institut fiziki vysokikh davleniy AN SSSR i Moskovskiy gosudarstvennyy universitet im. M.V. Lomonosova. 2. Chlen-korrespondent AN SSSR (for Vereshchagin).

KABALKINA, S.S.; VERESHCHAGIN, L.F.; MYLOV, V.P.

Phase transitions in antimony under high pressure. Dokl. AN SSSR 152 no.3:585-586 S '63. (MIRA 16:12)

1. Institut fiziki vysokikh davleniy AN SSSR. 2. Chlen-korrespondent AN SSSR (for Vereshchagin).

KABALKINA, S.S.; POPOVA, S.V.; SEREBRYANAYA, N.R.; VERESHCHAGIN, L.F.

New modification of Ag_2O with a laminar structure. Dokl. AN SSSR 152 no.4:853-854 O '63. (MIRA 16:11)

1. Institut fiziki vysokikh davleniy AN SSSR. 2. Chlen-korrespondent AN SSSR (for Vereshchagin).

SEMERCHAN, A.A.; KUZIN, N.N., DROZDOVA, L.N.; VERESHCHAGIN, L.F.

Variations in the electric resistance of PbS, PbSe, and PbTe at pressures up to 200,000 kg./cm^2. Dokl. AN SSSR 152 no.5:1079-1081 O '63. (MIRA 16:12)

1. Institut fiziki vysokikh davleniy AN SSSR. 2. Chlen-korrespondent AN SSSR (for Vereshchagin).

ARKHIPOV, R.G.; VERESHCHAGIN, L.F.

Plastic deformations in a gravitating sphere. Dokl. AN SSSR 153 no.4:832-834 D '63. (MIRA 17:1)

1. Institut fiziki vysokikh davleniy AN SSSR. 2. Chlen-korrespondent AN SSSR (for Vereshchagin).

ACCESSION NR: AP4041747 S/0181/64/006/007/2223/2225

AUTHORS: Vereshchagin, L. F.; Itskevich, Ye. S.; Atabayeva, E. Ya.; Popova, S. V.

TITLE: On a new modification of Bi_2Se_3

SOURCE: Fizika tverdogo tela, v. 6, no. 7, 1964, 2223-2225

TOPIC TAGS: bismuth inorganic compound, polymorphism, metal structure, x ray diffraction study

ABSTRACT: This is a continuation of an earlier study (FTT v. 6, 000, 1964) of the electric resistivity of Bi_2Se_3 as a function of the pressure in the interval up to 140 kbar at room temperature. Along with the previously observed reversible transition to the metallic state observed near 100 kbar at room temperature, an irreversible polymorphic transition was observed at 800C and 120--55 kbar, to

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ACCESSION NR: AP4041747

a new phase Bi_2Se_3 II which is metastable under normal conditions. To confirm the polymorphic nature of the transition, the sample was annealed for 2 hours in pure helium (500C), and the reverse transition Bi_2Se_3 II → Bi_2Se_3 I was established by x-ray diffraction. The x-ray diffraction pattern has 40 lines which could be identified in a structure of the bismuth type (Bi_2S_3), orthorhombic cell, space group Pbnm (D_{2h}^{16}). The unit cell parameters of the new phase are $a = 11.63 \pm 0.03$ Å, $b = 11.76 \pm 0.03$ Å, and $c = 4.06 \pm 0.01$ Å. The density determined by x-ray diffraction and pycnometrically is 7.8 and 8.0 ± 0.3 g/cm^3, respectively, confirming the correctness of the proposed structure. The resistivity of the new phase is 1.2--1.5 ohm-cm, and the temperature coefficient of resistivity is negative between 0 and 100C. The data confirm the correlation between the electric properties and the crystal structure inherent in compounds A_2B_3 of elements of groups V-VI. Data on the electric properties

ACCESSION NR: AP4041747

of the new phase will be published in the future. "The authors thank S. S. Kabalkina for help with the x-ray diffraction studies." Orig. art. has: 2 tables.

ASSOCIATION: Institut fiziki vy*sokikh davleniy AN SSSR, Moscow (Institute of High Pressure Physics, AN SSSR)

SUBMITTED: 19Mar64 ENCL: 00

SUB CODE: SS NR REF SOV: 001 OTHER: 002

Card 3/3

ACCESSION NR: AP4043610 S/0056/64/047/002/0414/0418

AUTHORS: Vereshchagin, L. F.; Kabalkina, S. S.

TITLE: Phase transitions in antimony at high pressures

SOURCE: Zh. eksper. i teor. fiz., v. 47, no. 2, 1964, 414-418

TOPIC TAGS: high pressure effect, antimony, single crystal, cunic symmetry, phase transition

ABSTRACT: This is a sequel of earlier work by the authors (with V. P. My*lov, DAN SSSR, v. 152, 585, 1963), except that single-crystal antimony was used with A7 structure at room temperature. X-ray diffraction studies have disclosed the presence of two reversible phase transitions: SbI → SbII (at 70 kbar into a primitive cubic structure) and SbII → SbIII (at 85 kbar -- into a close packed hexagonal structure). The pressure at which the phase transition took place could be determined by plotting the ratio of the

Card 1/2

ACCESSION NR: AP4043610

lattice parameters against the pressure. The phase transitions are accompanied by an increase in the coordination number. In the first transition the coordination number becomes equal to 6 (in place of 3), and in the second transition it becomes equal to 12. The atomic radius assumes in this case values of 1.49 and 1.66 Å, respectively. The results have established that the first transition is the result of gradual removal of distortion from the initial A7 structure. Orig. art. has: 4 figures and 4 tables.

ASSOCIATION: Institut fiziki vy*sokikh davleniy Akademii nauk SSSR (Institute of High Pressure Physics, Academy of Sciences SSSR)

SUBMITTED: 25Feb64 ENCL: 00

SUB CODE: SS NR REF SOV: 004 OTHER: 007

Card 2/2

ACCESSION NR: AP4012965 S/0020/64/154/004/0819/0820

AUTHOR: Panfilov, V. V.; Vereshchagin, L. F. (Corresponding Member AN SSSR)

TITLE: Paramagnetic resonance in MnS in a wide temperature range

SOURCE: AN SSSR. Doklady*, v. 154, no. 4, 1964, 819-820

TOPIC TAGS: paramagnetic resonance, antiferromagnetic, resonance absorption, manganese sulfide

ABSTRACT: The present work was undertaken in order to find the reason for the discrepancy in the results of other authors who studied the resonance of uniaxial antiferromagnetics during the transition from the paramagnetic to the antiferromagnetic state. The resonance in MnS powder has been measured in the temperature interval between +100 to -195C at a frequency of 9285 Mc. The apparatus is described [essentially a double Dewar and heating arrangement]. The constant magnetic field of an electromagnet was perpendicular to the magnetic component of the high-frequency field at the location of the specimen. The resonance absorption maximum at first increases somewhat with decreasing temperature, then decreases rapidly.

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ACCESSION NR: AP4012965

The half-width of the absorption line increases rapidly. The results obtained agree with those of L. R. Maxwell and T. R. McGuire (Rev. Mod. Phys. 25, 279 (1963)). Orig. art. has: 4 figures.

ASSOCIATION: Institut fiziki vy*sokikh davleniy Akademii nauk SSSR (Institute for High-Pressure Physics, Academy of Sciences SSSR)

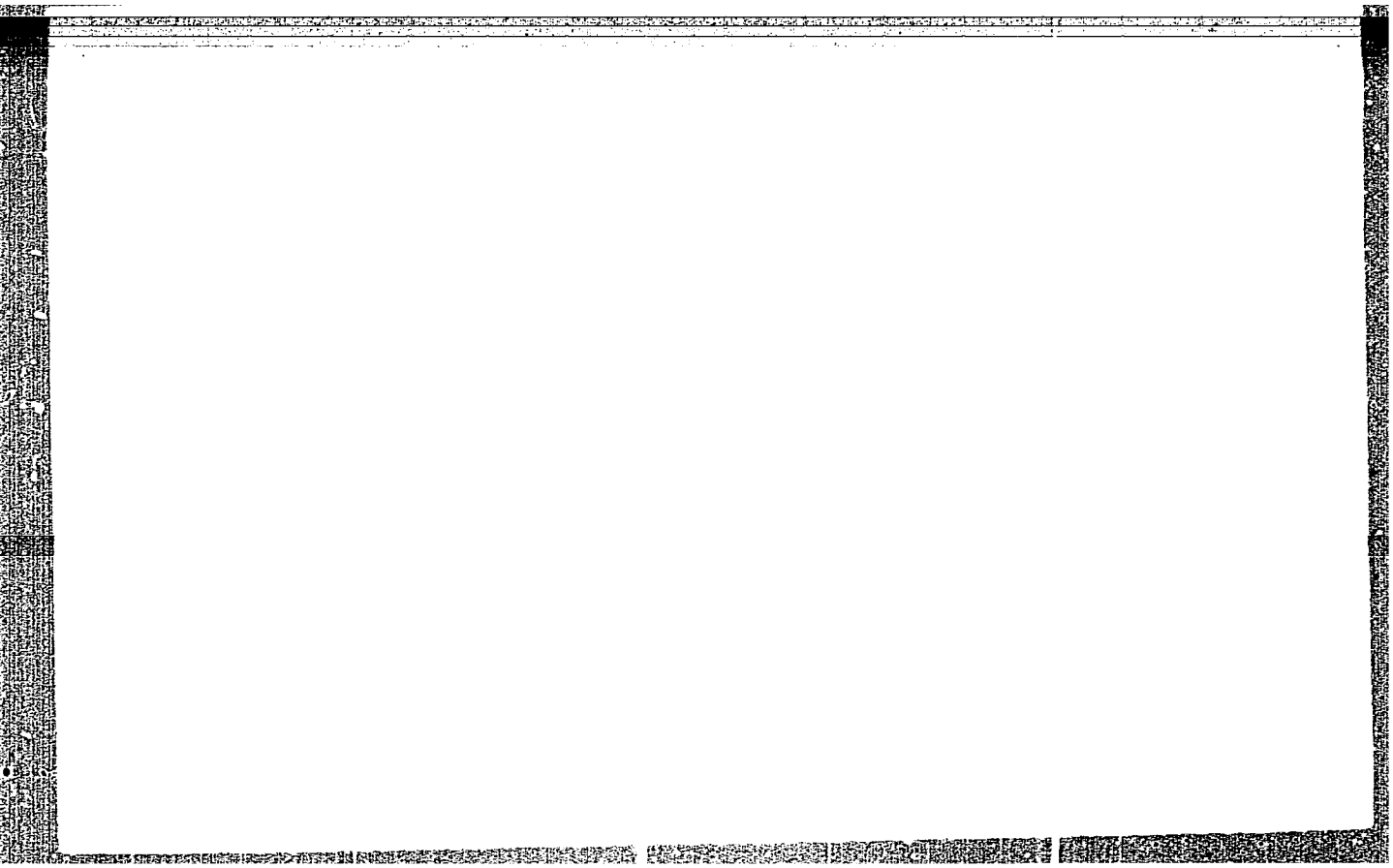
SUBMITTED: 170ct63 ATD PRESS: 3045 ENCL: 00

SUB CODE: GP NO REF SOV: 000 OTHER: 007

Card 2/2

APPROVED FOR RELEASE: 09/01/2001 CIA-RDP86-00513R001859430003-8"

dense polycrystalline



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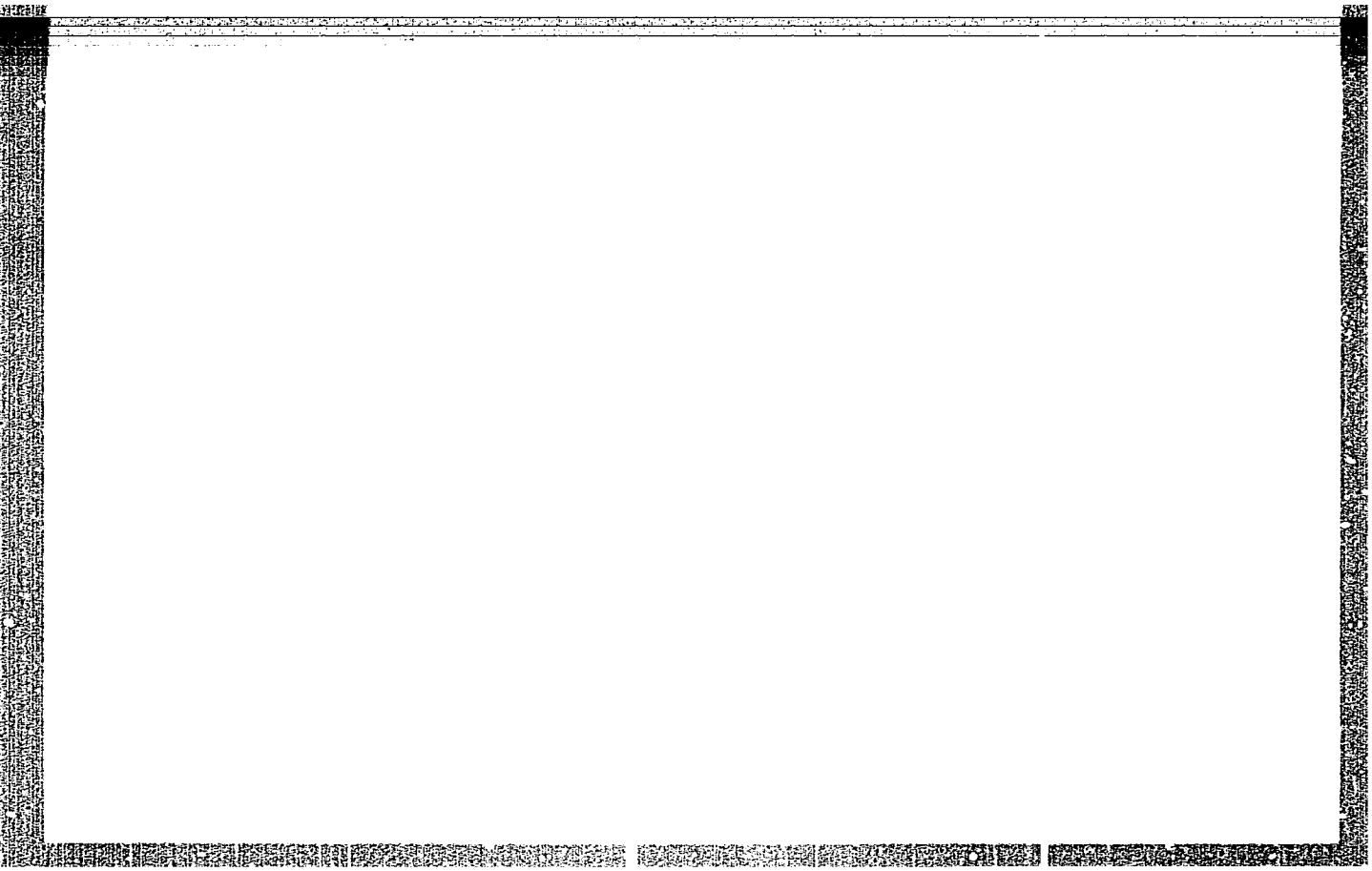
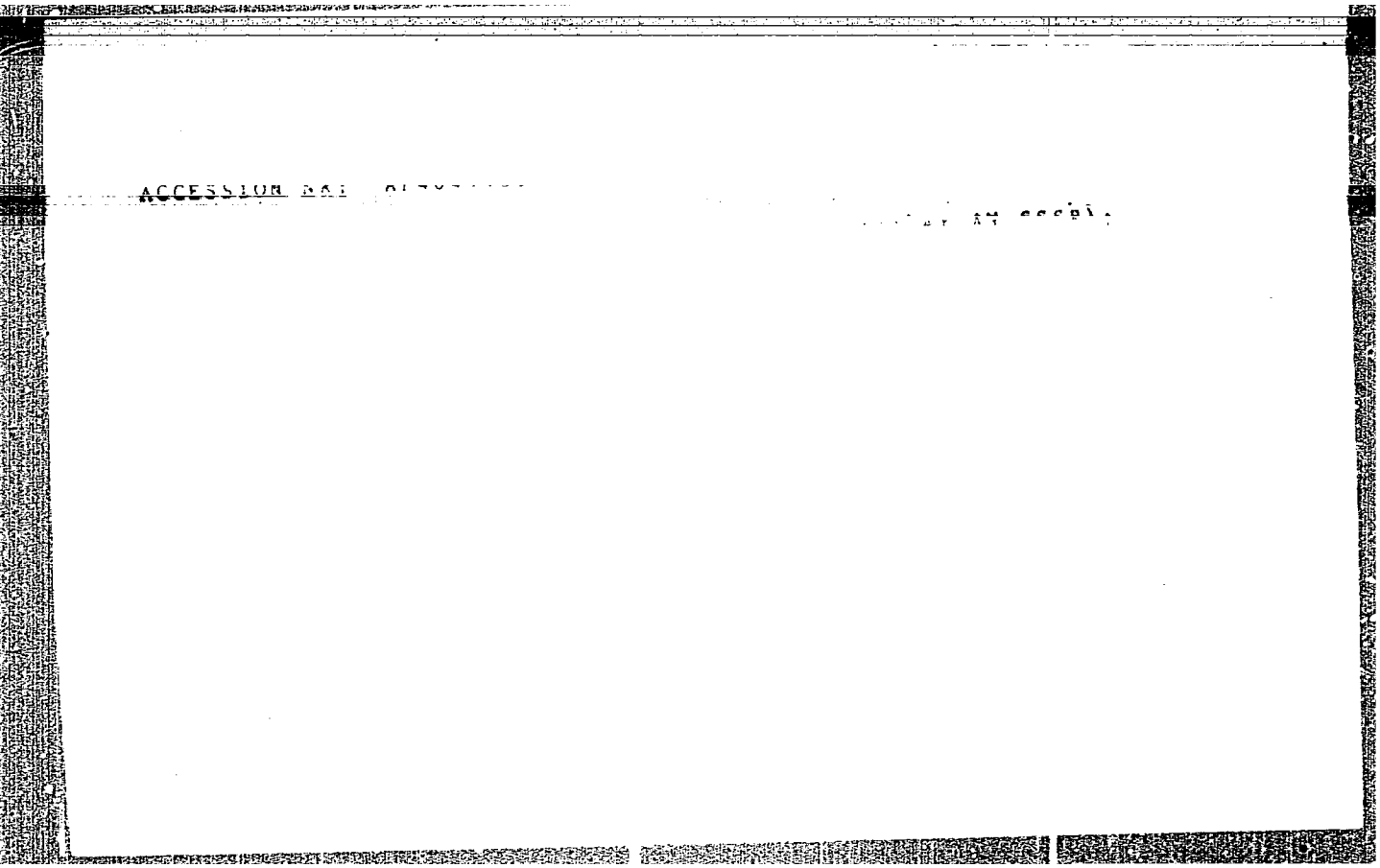


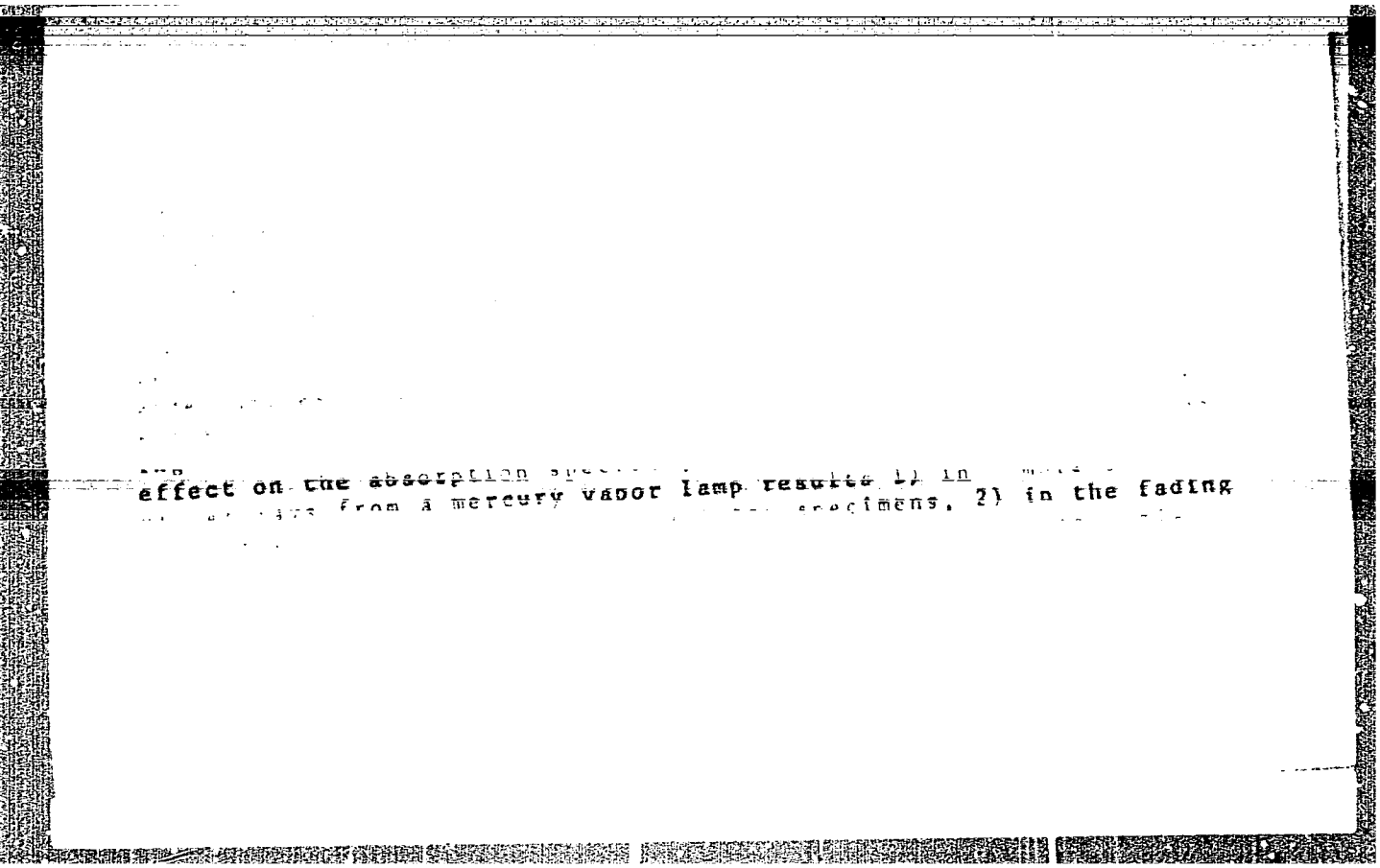
APPROVED FOR RELEASE: 09/01/2001 CIA-RDP86-00513R001859430003-8"

BENDELIANI, N.A.; VERESHCHAGIN, L.F.

Synthesis of dense modifications of silica with the use of water at a pressure of $150 \cdot 10^3$ kg/cm^2. Dokl. AN SSSR 158 no.4:819-820 O '64. (MIRA 17:11)

1. Institut fiziki vysokikh davleniy AN SSSR. 2. Chlen-korrespondent AN SSSR (for Vereshchagin).





effect on the absorption spectra ... results 1) in ... from a mercury vapor lamp ... specimens, 2) in the fading

VERESHCHAGIN, L.F.; [illegible], Ya.L., [illegible], E.Yu.; [illegible], S.V.

New modification of [illegible]. Fiz. tver. tela [illegible] (MIRA 17:10)

1. Institut fiziki vysokikh davleniy AN SSSR, Moskva.

VERESHCHAGIN, L.F.; KABALKINA, S.S.

Phase transitions in antimony at high pressures. Zhur. eksp. i teor. fiz. 47 no.2:414-418 Ag '64. (MIRA 17:10)

1. Institut fiziki vysokikh davleniy AN SSSR.

VERESHCHAGIN, L.F.; KABALKINA, S.S.; TROITSKAYA, Z.V.

Effect of high pressure on the structure of gallium and indium. Dokl. AN SSSR 158 no.5:1061-1063 O '64. (MIRA 17:10)

1. Institut fiziki vysokikh davleniy AN SSSR. 2. Chlen-korrespondent AN SSSR (for Vereshchagin).

L 21017-66 EWT(m)/T/EWP(t)/EWA(h) IJP(c) JD

ACCESSION NR: AP5018741 UR/0020/65/163/002/0326/0328

AUTHOR: Vereshchagin, L. F. (Corresponding member AN SSSR); Kabalkina, S. S.; Lityagina, L. M.

TITLE: Investigation of the influence of high pressure on the structure of tin oxide

SOURCE: AN SSSR. Doklady, v. 163, no. 2, 1965, 326-328

TOPIC TAGS: pressure effect, tin compound, crystal lattice structure, phase transition

ABSTRACT: An x-ray investigation of the structure of SnO was made at room temperature and pressures up to 100 kbar. A special x-ray camera (DAN v. 151, no. 5, 1068, 1963; J. Jamieson and A. W. Lawson, J. Appl. Phys. v. 33, no. 3, 776, 1962) with molybdenum radiation was used, the main part of which was a pellet made of amorphous boron and a channel for the sample. The pressure could be determined accurate to ±5 kbar. The results show that at high pressures SnO experiences a reversible phase transition. In most cases this transition occurs at 40--50 kbar, although in some experiments it was observed at 15--20 kbar. The unit cell parameters of the high-pressure phase are a = 3.42 ± 0.02 Å and c = 5.62 ± 0.04 Å. A sudden change in volume of 7.0 ± 5% was observed during the phase transition (at

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L 21017-66

ACCESSION NR: AP5018741

40 kbar). The two phases differ from each other in the order of arrangement of the crystal layers and the arrangement of the nearest neighbors of the tin atoms. The results show also that the phase transition is reconstructive, in that the Sn...O bond in the low-pressure phase is destroyed during the transition and a new bond is produced. It is suggested in analogy with earlier data by others that at higher pressures SnO will experience a polymorphic transition from a wurtzite structure to a NaCl structure. Orig. art. has: 3 figures and 1 table.

ASSOCIATION: Institut fiziki vysokikh davleniy Akademii nauk SSSR (Institute of High Pressure Physics, AN SSSR)

SUBMITTED: 06Apr65 ENCL: 00 SUB CODE: SS

NR REF SOV: 001 OTHER: 007

Card 2/2 BK

L 7086-66 EWT(m)/ETC/EWG(m)/EWP(t)/EWP(k)/EWP(b)/EWA(h)/EWA(c) IJP(c)

ACC NR AP5...

AUTHOR: Vereshchagin, L. F. (Corresponding member AN SSSR); Kabalkina, S. S.; Shulenin, B. M.

ORG: Institute of Physics of High Pressures, Academy of Sciences, SSSR (Institut fiziki vysokikh davleniy Akademii nauk SSSR)

TITLE: X-ray diffraction investigation of the compressibility of hexagonal selenium up to 15 kbar

SOURCE: AN SSSR. Doklady, v. 165, no. 2, 1965, 297-298

TOPIC TAGS: pressure effect, superhigh pressure, selenium, x ray diffraction study

ABSTRACT: Earlier studies by the authors on single-crystal tellurium (ZhETF v. 45, 2073, 1963) are extended to include hexagonal selenium. The x-ray diffraction study was carried out in a special chamber, described elsewhere (DAN v. 143, 818, 1962), in which the high-pressure vessel was a cone of metallic beryllium with a channel ... diam for the sample. Aviation gasoline was used to transmit the pressure, which was measured with a manganin manometer accurate to ±100 bar. The hexagonal selenium modification was prepared from the amorphous one at 60 kbar at 400°. The results (Fig. 1) show that selenium has a highly anisotropic compressibility, similar to that of tellurium. The results can be attributed to the fact that compression brings the lattice structures of the two substances closer to cubic. The pressure dependence of the compressibility agrees well with data previously obtained by P. W. Bridgman (Proc. Am.

Card 1/2 UDC: 539.26

L 7086-66
ACC NR: AP5028273

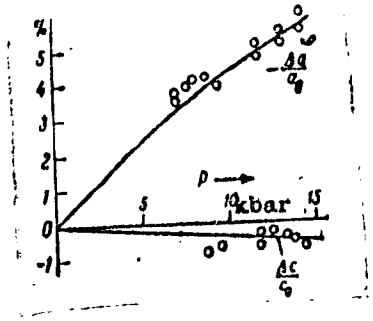

Fig. 1. Linear compressibility of selenium vs pressure

Acad. Sci. v. 74, 425, 1942). Orig. art. has: 3 figures and 3 tables. [02]

SUB CODE: SS/ SUBM DATE: 12Aug65/ ORIG REF: 003/ OTH REF: 003/ ATD PRESS: 4143

nw

Card 2/2

ARTSIMOVICH, L.A., akademik; KELDYSH, M.V., akademik; KAPITSA, P.L., akademik; VUL, B.M.; VERESHCHAGIN, L.F.; PISTOL'KORS, A.A.; SHCHUKIN, A.N., akademik; SKOBEL'TSYN, D.V., akademik; ALEKSANDROV, A.P., akademik; AMBARTSUMYAN, V.A., akademik; ZEL'DOVICH, Ya.B.; SEMENOV, N.N., akademik; KOTEL'NIKOV, V.A., akademik; LIFSHITS, I.M.; VEKSLER, V.I., akademik; GINZBURG, V.L.; MILLIONSHCHIKOV, M.D., akademik

Some problems in the development of modern physics; discussion of the work of the Department of General and Applied Physics. Vest. AN SSSR 35 no.2:3-46 F '65. (MIRA 18:3)

1. Chleny-korrespondenty AN SSSR (for Vul, Vereshchagin, Pistol'kors, Lifshits, Ginzburg).

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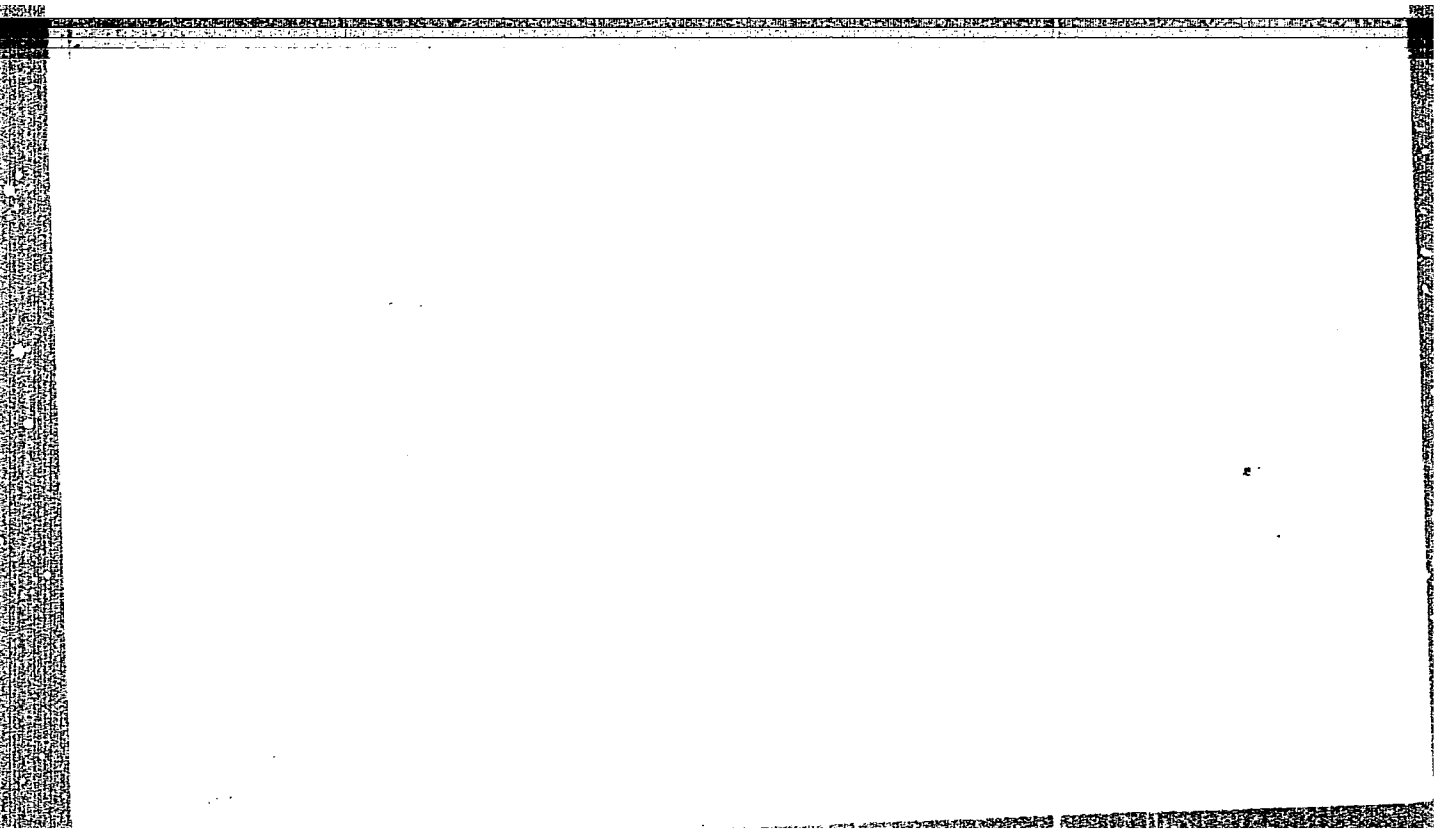

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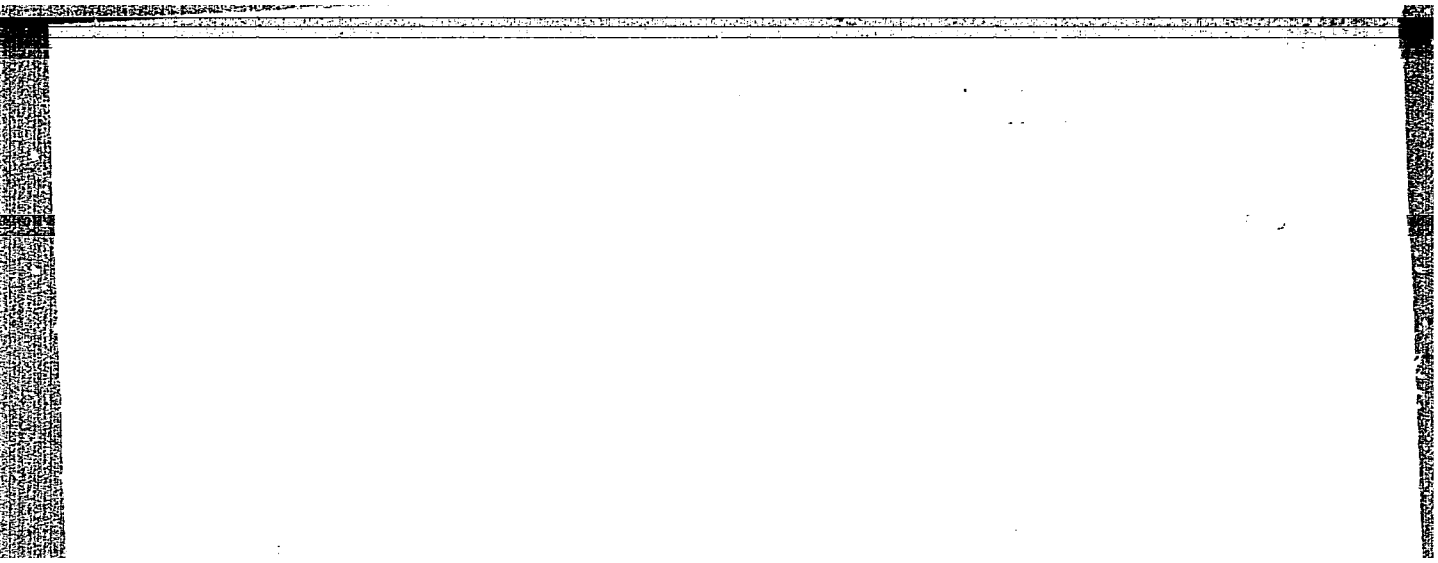

APPROVED FOR RELEASE: 09/01/2001 CIA-RDP86-00513R001859430003-8"

FEDYUSHIN, N.D.; DIKUSHIN, V.I., akademik, retsenzent; VERESHCHAGIN, L.F., retsenzent; SUVORINA, L.N., inzh., red.

[Selecting optimal variants of thick-walled structures; handbook] Vybor optimal'nykh variantov tolstostennykh konstruktsii; spravochnoe posobie. Moskva, Mashinostroenie, 1965. 81 p. (MIRA 18:6)

1. Chlen-korrespondent AN SSSR (for Vereshchagin).

VERESHCHAGIN, L.F.; KABALKINA, S.S., KOZLOVSKIY, A.F.

Phase transition in MnF_2 at high pressure. Fiz. tver. tela 7 no.6:1729-1732 Je '65. (MIRA 18:7)

1. Institut fiziki vysokikh davleniy AN SSSR. Submitted July 12, 1965.

L 38427-66 EWT(m)/EWP(k)/EWP(t)/ETI IJP(c) MW/JD

ACC NR: AP6024409 SOURCE CODE: UR/0020/66/169/001/0074/0076 58 B

AUTHOR: Vereshchagin, L. F. (Corresponding member AN SSSR); Zubova, Ye. V.; Burdina, K. P.; Buymova, I. P.

ORG: Institute of High Pressures, Academy of Sciences SSSR (Institut vysokikh davleniy Akademii nauk SSSR)

TITLE: Measuring pressures up to 100 kbar by the free-plunger method 18

SOURCE: AN SSSR. Doklady, v. 169, no. 1, 1966, 74-76

TOPIC TAGS: pressure, high pressure, pressure measurement, high pressure measurement, pressure gage, high pressure research, metal test [redacted]

ABSTRACT: A pressure gage based on the free-plunger principle, for measuring pressures up to 100 kbar, has been designed and built. The pressure in the high-pressure chamber is measured directly by a spring dynamometer connected to a free plunger (see Fig. 1). The friction of the plunger is reduced to an insignificant value by the special configuration of the plunger, and by a special lubricant filling clearance C. The top and bottom ends of the plungerare coaxial cylinders, which ensures the stability of the plunger and prevents a runoff of the compressed substance. The pressure gage was used for measuring the pressure of the polymorphic transformation of some metals. The

Card 1/2 UDC: 539.89

L 38127-66

ACC NR: AP6024409

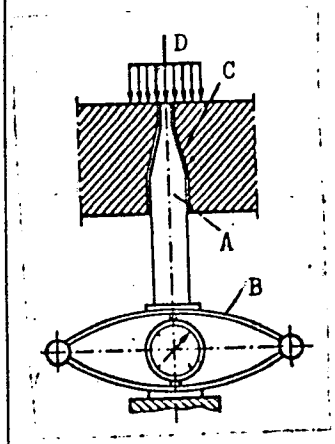

Fig. 1. Scheme of a piston-type manometer

A - Plunger;
B - dynamometer;
C - clearance;
D - pressure.

obtained values agree well with those found by other scientists for polymorphic transformations Bi I-II, Bi II-III, and Tl II-III (25.4, 26.9, 36.7 kbar, respectively). The gage facilitated the measurement of pressures above 40 kbar; for instance, for polymorphic transformations Ba II-III and Bi VI-VIII measurements yielded pressures of 58.5 and 89.3 kbar, respectively. Orig. art has: 2 figures. [WW]

SUB CODE: 20/ SUBM DATE: 18Feb66/ ORIG REF: 005
OTH REF: 002/ ATD PRESS: 5043

Card 2/2

L 04490-67 EWT(m)/T/EWP(t)/ETI IJP(c) JD

ACC NR: AP6031429 SOURCE CODE: UR/0056/66/051/002/0377/0382

AUTHOR: Kabalkina, S. S.; Vereshchagin, L. F.; Kotilevets, A. A.

ORG: Institute of Physics of High Pressures, Academy of Sciences SSSR (Institut fiziki vysokikh davleniy Akademii nauk SSSR)

TITLE: Phase transition in TeO_2 under high pressure

SOURCE: Zh eksper i teor fiz, v. 51, no. 2, 1966, 377-382

TOPIC TAGS: phase transition, high pressure research, high pressure, tellurium dioxide, x ray diffraction

ABSTRACT: The effect of high pressure on the structure of the tetragonal phase of TeO_2 is investigated. An x-ray diffraction study of the structure of TeO_2I at room temperature and under pressures up to 100 kbar was carried out in a special x-ray chamber which included an amorphous boron pellet. The experiments show that at $p > 30$ kbar, TeO_2I undergoes a reversible phase transition of the first kind. According to the data obtained, the high-pressure phase (TeO_2II) possesses a rhombic lattice cell with the following parameter values at $p = 60$ kbar: $a = 4.22$ Å, $b = 4.84$ Å, $c = 3.67$ Å, $z = 2$, $\rho = 7.07$ g/cm^3; it belongs to the Fedorov Pnnm group. It is suggested that the high-pressure phase

Card 1/2

L 04490-67
ACC NR: AP6031429

is of the $CaCl_2$ type. The effect of pressure on the parameters of the unit cells of the TeO_2I and TeO_2II phases is evaluated. Orig. art. has: 4 figures and 2 tables. [CS]

SUB CODE: 20/ SUBM DATE: 25Jan66/ ORIG REF: 003/ OTH REF: 015
ATD PRESS: 5083

Card 2/2 egh

ACC NR: AP6037065 (A) SOURCE CODE: UR/0056/66/051/005/1358/1362

AUTHOR: Kabalkina, S. S.; Vereshchagin, L. F.; Serebryanaya, N. R.

ORG: Institute of Physics of High Pressures, Academy of Sciences, SSSR (Institut fiziki vysokykh davleniy Akademii nauk SSSR)

TITLE: Germanium telluride phase transformation under high pressure

SOURCE: Zhurnal eksperimental'noy i teoreticheskoy fiziki, v. 51, no. 5, 1966, 1358-1362

TOPIC TAGS: germanium telluride, ~~germanium telluride~~ crystal structure, ~~germanium telluride~~ phase transition, phase transformation, pressure effect

ABSTRACT: The effect of high pressures up to 100 kbar on the crystal structure of GeTe has been investigated. A phase transition from a rhombohedral phase GeTeI (A7-type) to a cubic phase of GeTeII (NaCl type) was observed. X-ray diffraction analysis showed that at 35 kbar, the ratio c/a changes from 1.27 (GeTeI) to 1.224 (GeTeII), involving a volume change of 3%. In view of the presence of a continuous transition GeTeI → GeTeII at 400C, it is assumed that a critical point exists on the Ge-Te phase diagram. Orig. art. has: 5 figures and 1 table.

SUB CODE: 20, 11 / SUBM DATE: 16Jun66/ ORIG REF: 007/ OTH REF: 005/

Card 1/1

ACC NR: AP7003645 SOURCE CODE: UR/0020/67/172/001/0076/0076

AUTHOR: Kalashnikov, Ya.A.; Feklichev, Ye.N.; Sukhushina, I.S.; Vereshchagin, L.F. (Academician)

ORG: Institute of Physics of High Pressures, Academy of Sciences, SSSR (Institut fiziki vysokikh davleniy Akademii nauk SSSR); Moscow State University (Moskovskiy gosudarstvennyy universitet) im. M.V. Lomonosov

TITLE: Production of ballas-type synthetic diamonds

SOURCE: AN SSSR. Doklady, v. 172, no. 1, 1967, 76 and insert facing p. 76

TOPIC TAGS: ~~synthetic~~ diamond, synthetic diamond manufacturing, ~~production, synthetic diamond~~, structure crystal

ABSTRACT: Synthetic diamonds up to 6—6.5 mm in size with a central-zone density higher than that of natural diamonds have been produced. The density decreases to standard level at the specimen surface, which consisted of fine bound crystals. The internal and surface structure of the synthetic diamonds compared very closely to the ballas structure of natural diamond. [AZ]

SUB CODE: 11, 13/ SUBM DATE: 24Sep66/ ORIG REF: 001/ OTH REF: 006/
ATD PRESS: 5114

Card 1/1 UDC: 666.233

ACC NR: AP7005581 SOURCE CODE: UR/0020/67/172/002/0313/0316

AUTHOR: Kabalkina, S. S.; Kolobyanina, T. N.; Vereshchagin, L. F. (Academician)

ORG: Institute of High Pressure Physics, Academy of Sciences, SSSR (Institut fiziki vysokikh davleniy Akademii nauk SSSR)

TITLE: X ray diffraction investigation of the crystal structure of iodine at high pressure

SOURCE: AN SSSR. Doklady, v. 172, 2, 1967, 313-316

TOPIC TAGS: x ray diffraction study, iodine, high pressure research, crystal lattice structure, molecular crystal

ABSTRACT: The tests on iodine were made because at high pressure it is one of the few elements having a molecular structure, and may be the only element in which structure investigations can be made at room temperature. The authors carried out an x-ray diffraction study of its structure at room temperature and pressures up to 60 kbar, using a procedure described earlier (DAN v. 151, 1068, 1963) and molybdenum radiation. To improve the diffraction pattern, the iodine was tested in powdered form. The observed appearance and disappearance of several lines is reported, as well as coalescence of some lines with variation of pressure. In addition, the pressure dependence of the volume of the iodine and of the parameters of its lattice structure are plotted. The results indicate that pressure does not change the initial rhombic structure, merely distorting it and leading to some rotation of the molecules. It is

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Card 1/2

ACC NR: AP7005581

pointed out in the conclusion that in view of the ambiguities involved in the powder method, further research with single crystals is necessary to check on the conclusions concerning the structure of the high-pressure phase of iodine. Orig. art. has: 4 figures and 2 tables.

SUB CODE: 20/ SUBM DATE: 23Sep66/ ORIG REF: 003/ OTH REF: 011

Card 2/2

GILLER, S.A., akademik; VERESHCHAGIN, L.I.; VENTER, K.K.; KORSHUNOV, S.P.; TSIRULE, V.V. [Cirule, V.]; LOLYA, D.O.

2-Furyl and 5-nitrofuryl-2-acetylene ketones. Dokl. AN SSSR 164 no.1:99-102 S '65. (MIRA 18:9)

1. Institut organicheskogo sinteza AN Latviyskoy SSR i Institut nefte- i uglekhimicheskogo sinteza pri Irkutskom gosudarstvennom universitete im. A.A. Zhdanova. 2. An Latviyskoy SSR (for Giller).